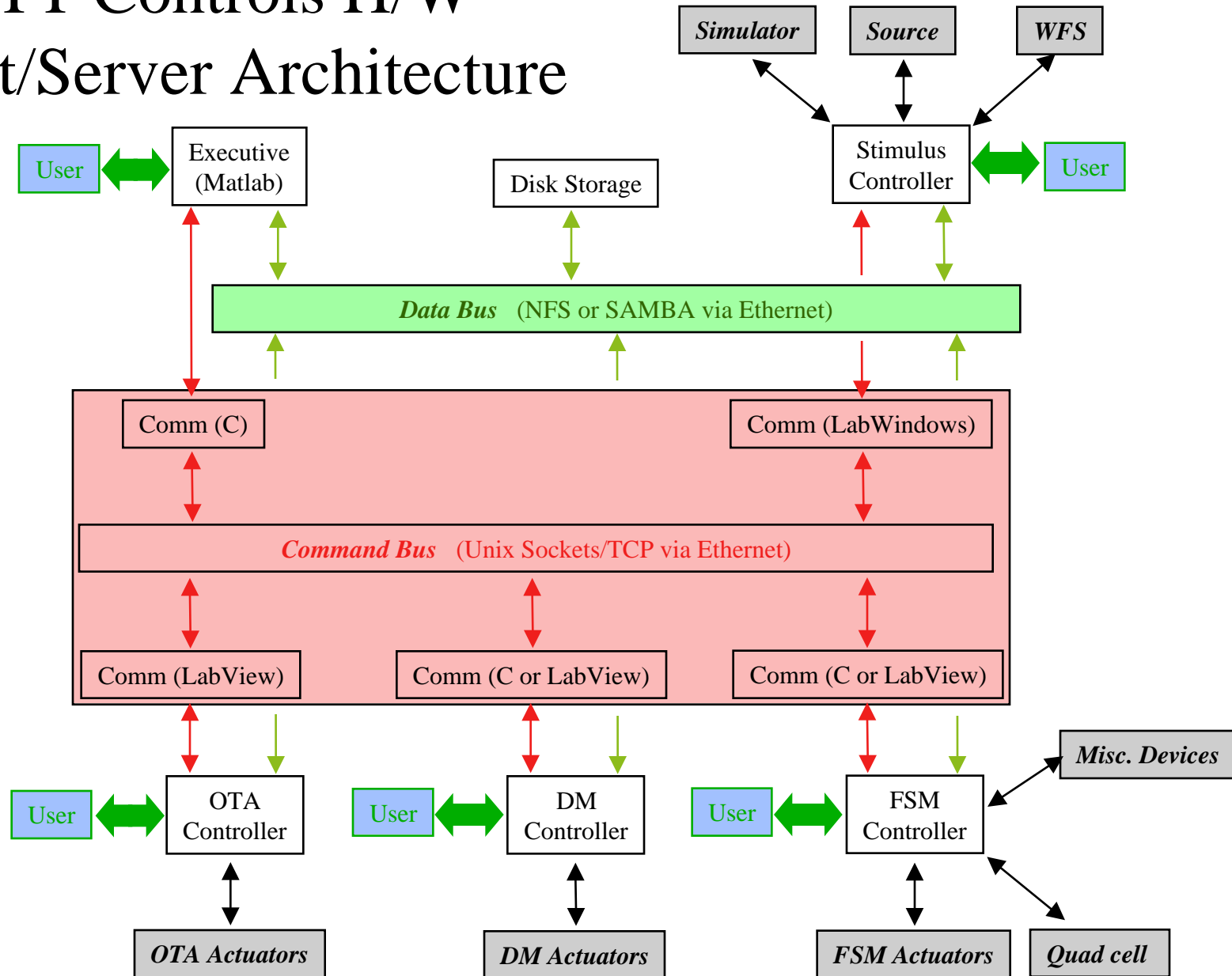# DCATT Controls Software Overview

Gary Mosier

NASA/GSFC

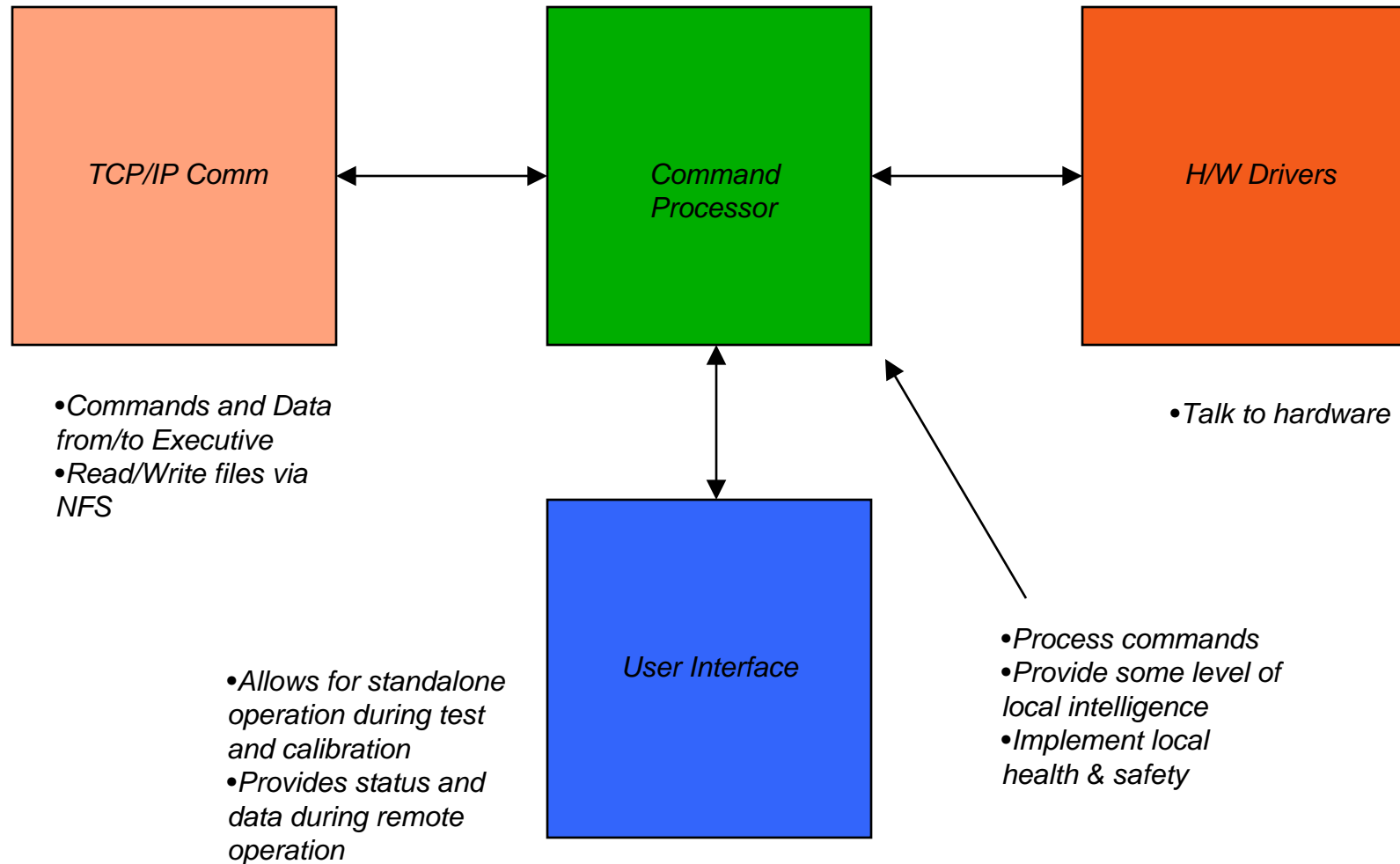August 17, 1998

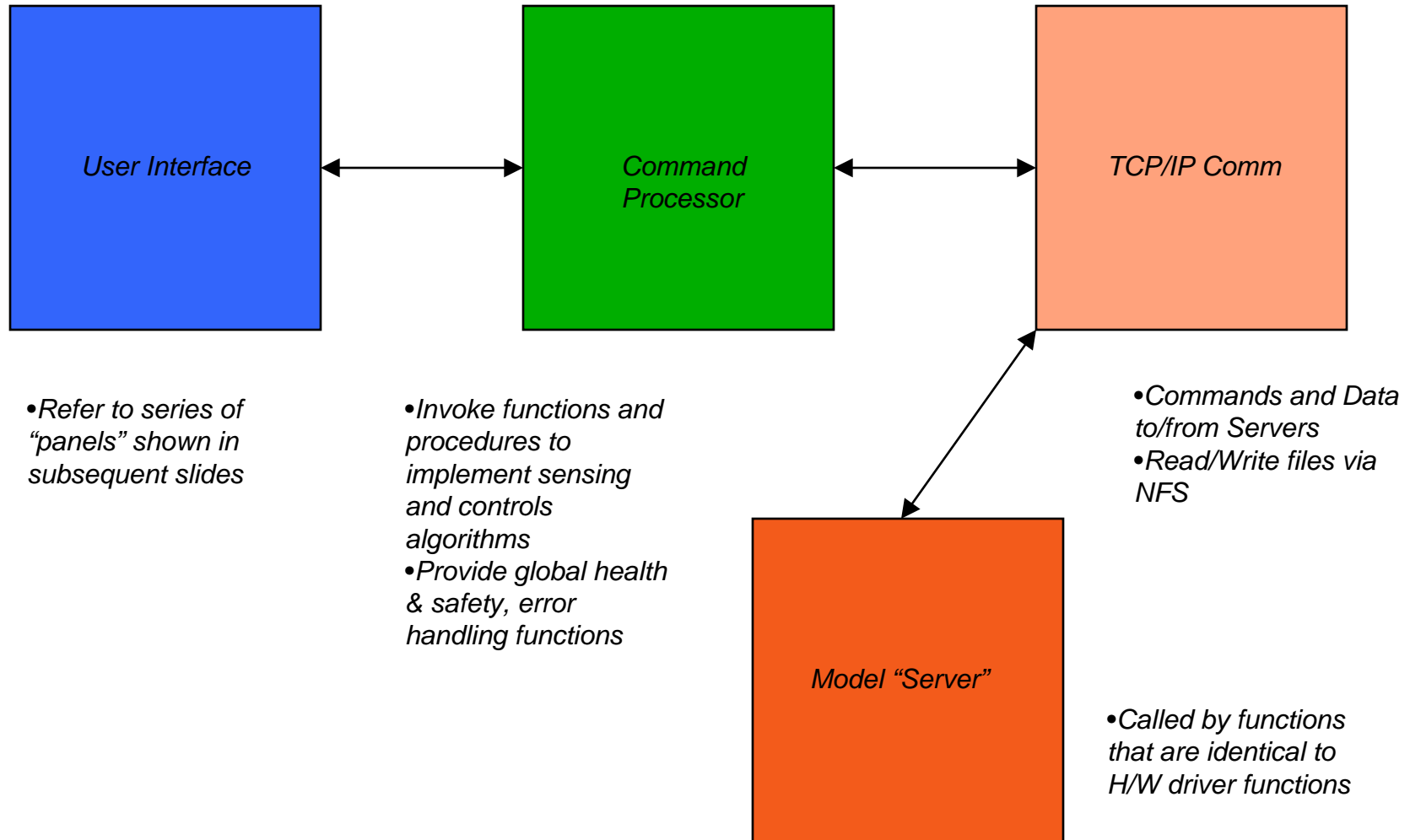# DCATT Controls H/W Client/Server Architecture

Control System Architecture

- Client/Server Architecture - Sun workstation as Client, PCs and Mac as Servers
- User generally interfaces with system via Matlab GUI on Sun
    - Optionally, procedures may be written in Matlab language to perform experiments
- Executive calls functions that are to be performed by remote subsystems
    - Functions initiate actions, query status of hardware, abort actions
    - Functions pass data
- Subsystems perform actions and return status
    - Subsystems also provide safety limits
- Subsystems can be controlled locally as well
- Communication is across ethernet using TCP/IP...
    - LabView and LabWindows running as TCP servers on PC's
    - Unix sockets on Sun accessing remote TCP ports
    - *TBD* running as TCP server on Macintosh (DM computer)
- Large data files are written directly to disk
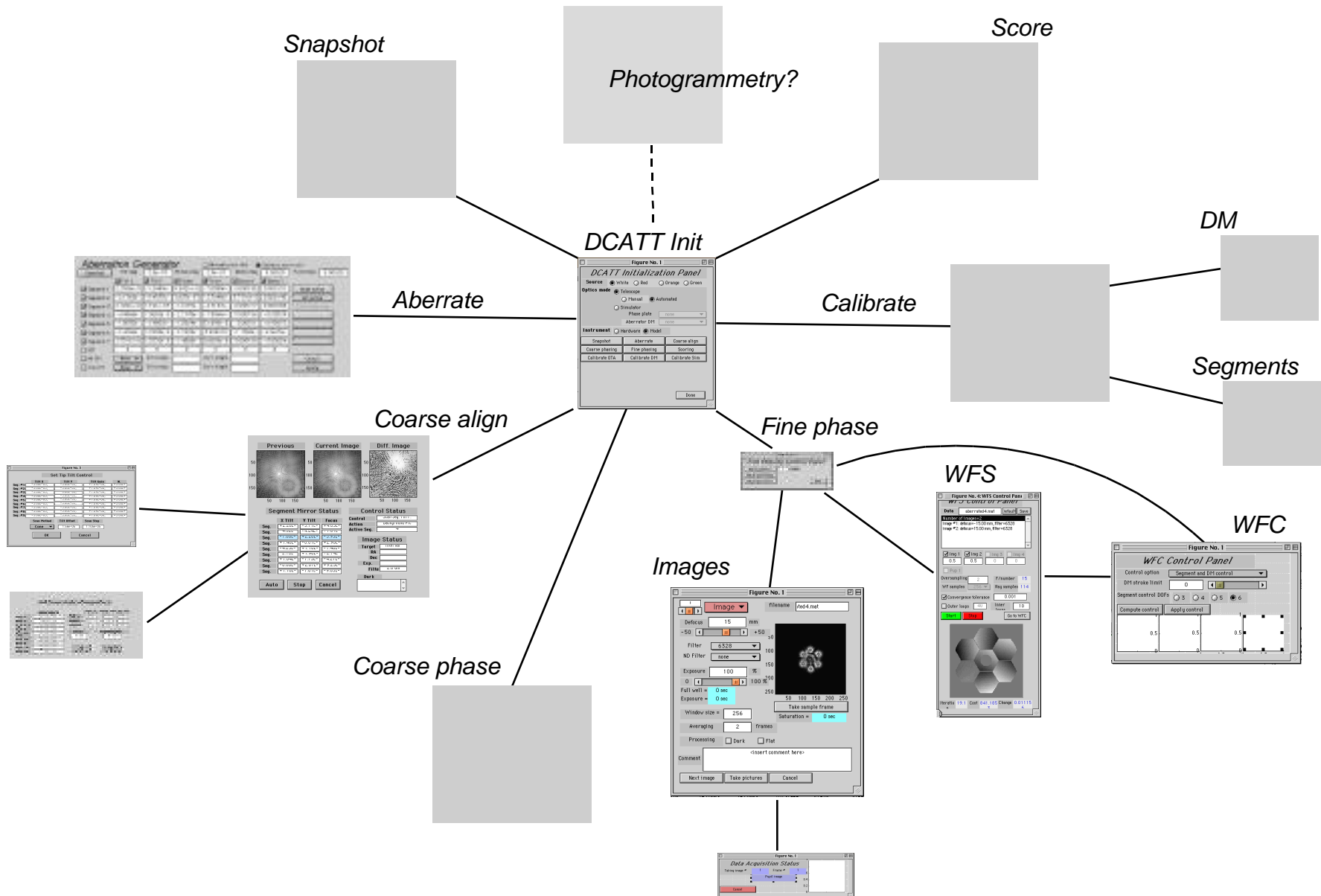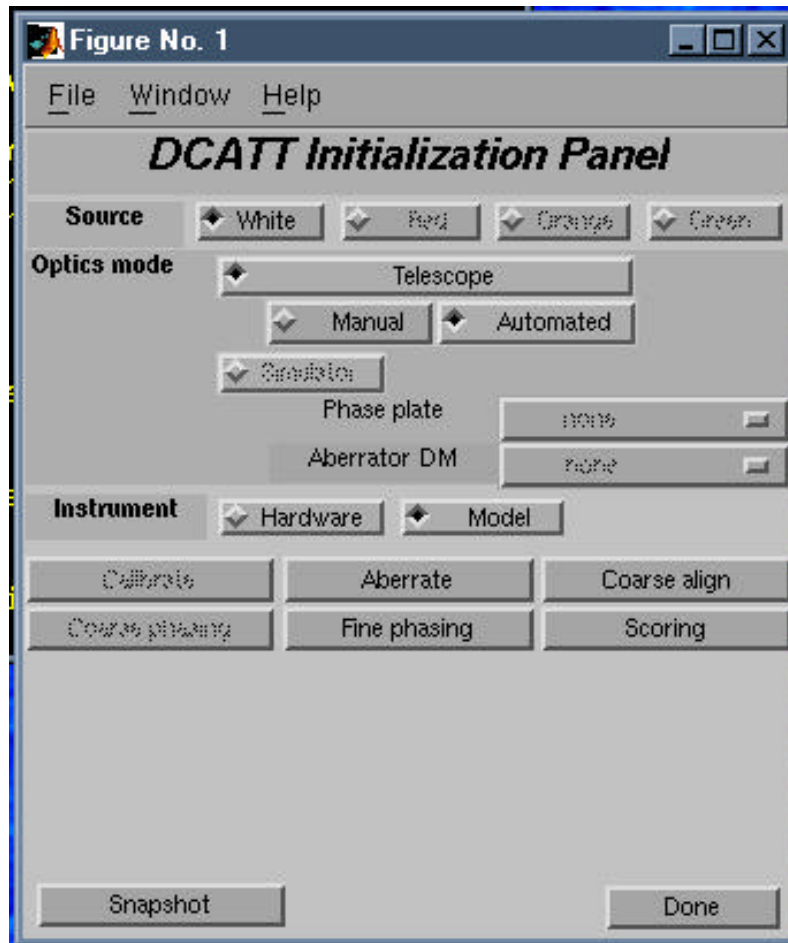   - Accessed via NFS

Server Architecture

TCP/IP Comm

Command Processor

H/W Drivers

User Interface

•Commands and Data from/to Executive
•Read/Write files via NFS

•Talk to hardware

•Allows for standalone operation during test and calibration
•Provides status and data during remote operation

•Process commands
•Provide some level of local intelligence
•Implement local health & safety

Client Architecture

User Interface	Command Processor	TCP/IP Comm

•Refer to series of "panels" shown in subsequent slides

•Invoke functions and procedures to implement sensing and controls algorithms
•Provide global health & safety, error handling functions

•Commands and Data to/from Servers
•Read/Write files via NFS

Model "Server"

•Called by functions that are identical to H/W driver functions

DCATT Executive Overall Flow

Snapshot

Photogrammetry?

Score

DM

DCATT Init

Aberrate

Calibrate

Segments

Coarse align

Fine phase

WFS

WFC

Images

Coarse phase

Initialization Panel

- Turns on system, sets optics
  - Sources
  - Simulator vs. telescope
  - Model vs. hardware vs. both
- Gateway to control functions
  - Align
  - Phase
  - Fine phase
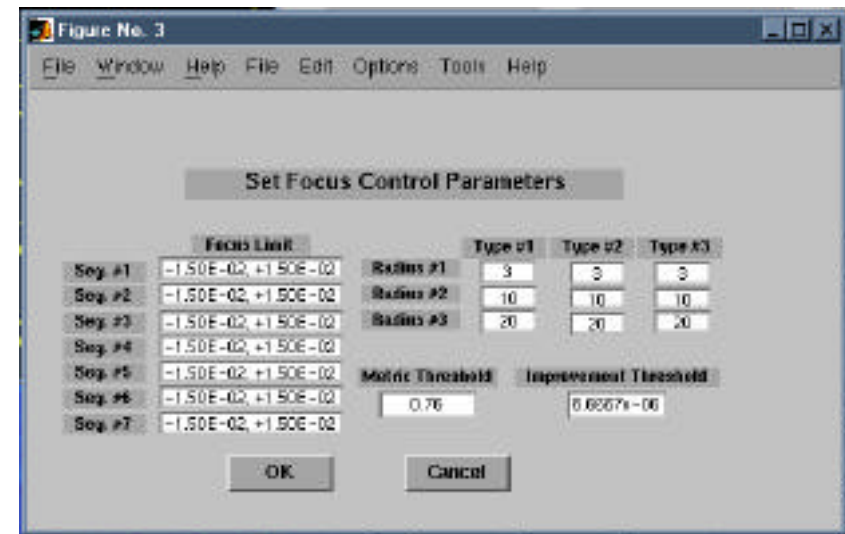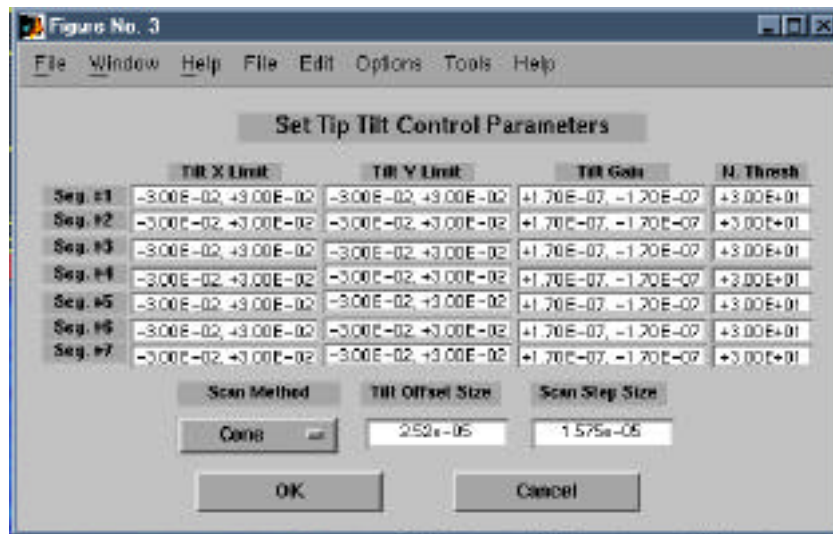 - Calibrate
  - Score

Aberrate Panel

- Define a problem to be solved
  - Initial conditions set in terms of 's or absolutes
- Some or all DOFs
  - OTA, DM, Simulator
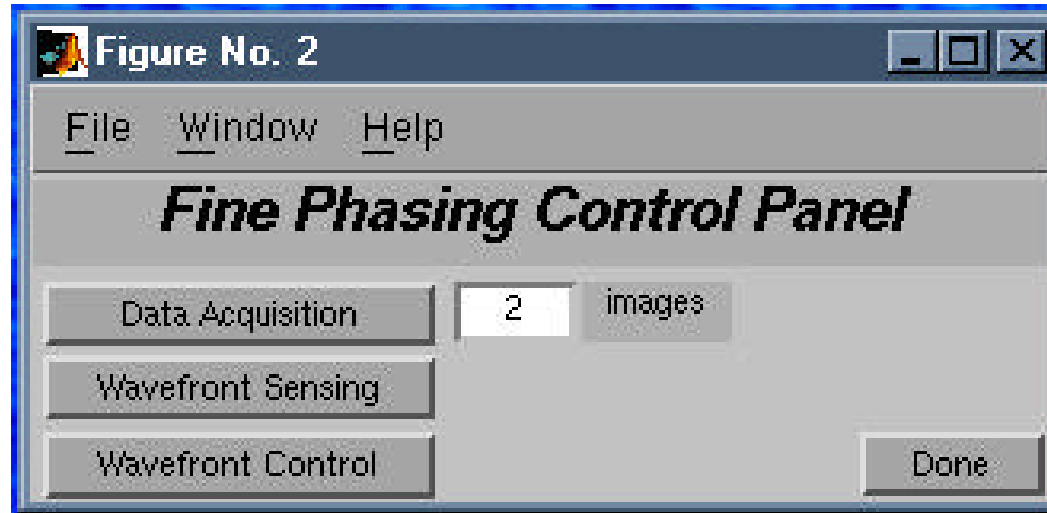
Coarse Align Panel
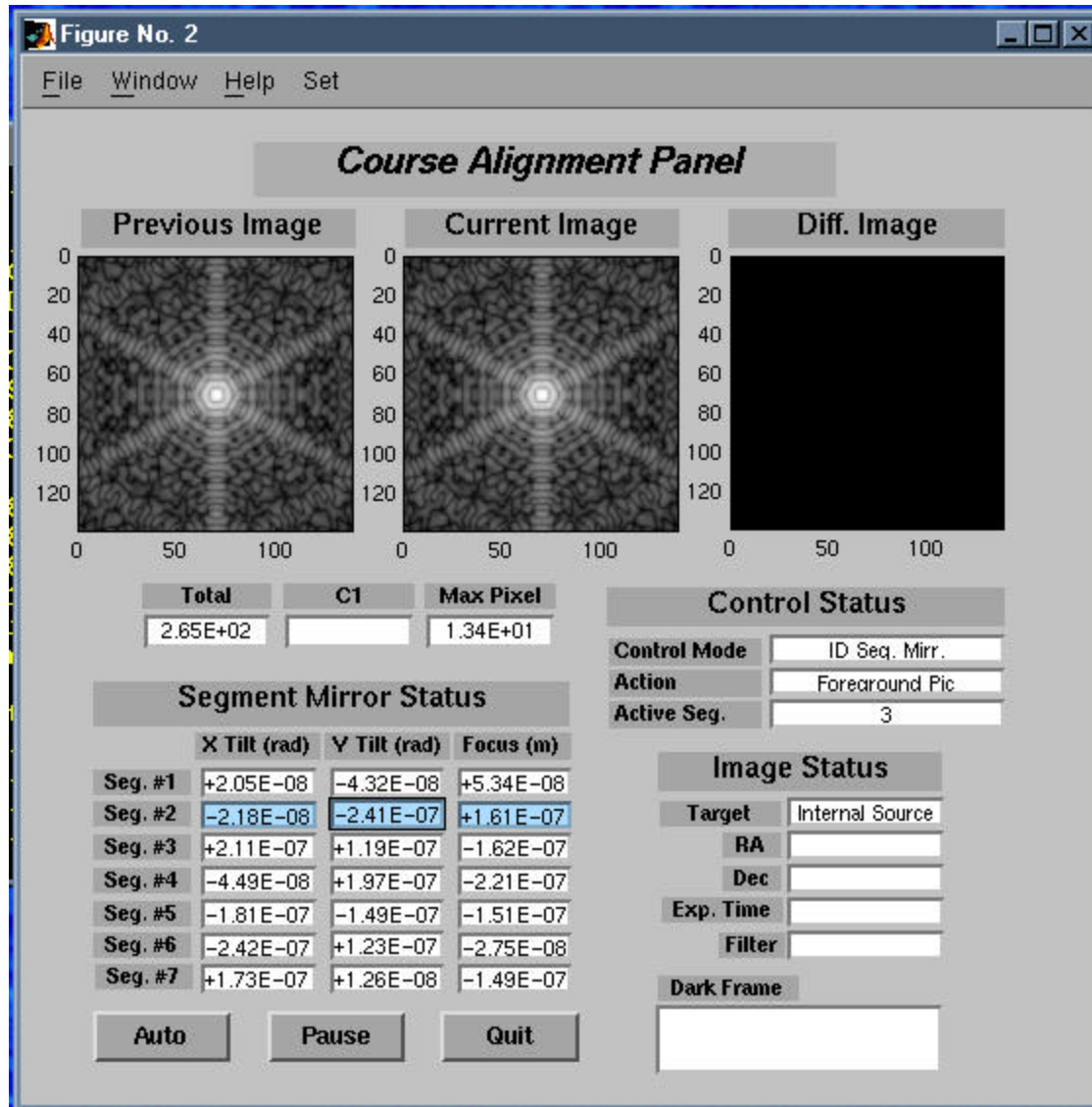
- Control panel
  - Get here by pressing "Coarse align" on Init panel
  - First panel shows starting point image
  - Number boxes show tilt and focus control as implemented

Coarse Align Options Panels

- Selected from menu on "control" panel
- Set bounds, gains for alignment and focussing operations

Fine Phasing Control Panel

- Get here from "Init" panel
- "Data acquisition" button opens panels that specify data to be taken
- "Select default" allows selection of previously taken data sets
- "WFC" button opens wavefront sensing and wavefront control panels
  - Run after DAQ or on archived data
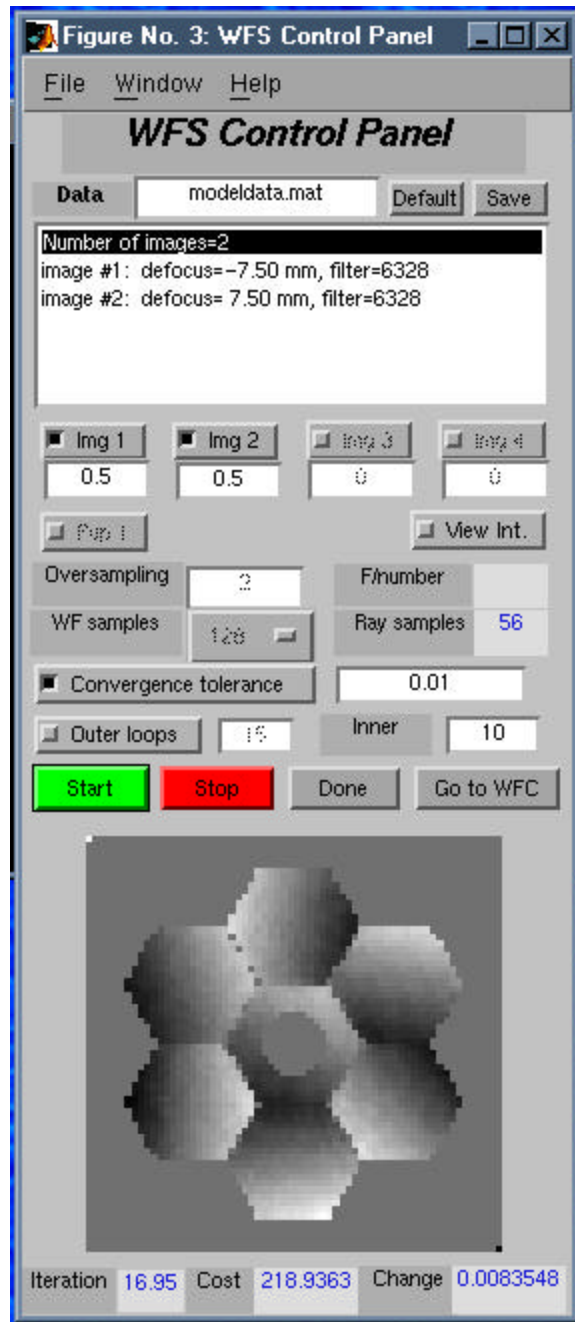
Image DAQ Control Panel
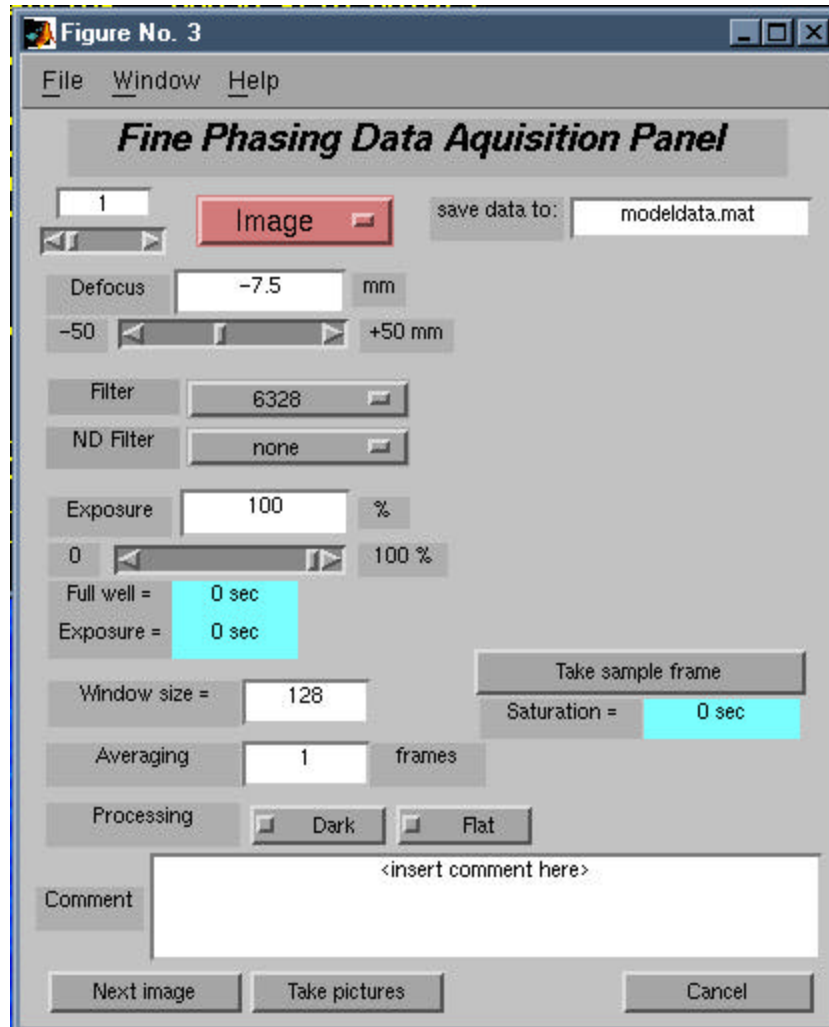
- Specify conditions for each image in a data run
- Data stored together for WFS/WFC processing
- Full data run performed after all pictures specified

DAQ Monitor Panel
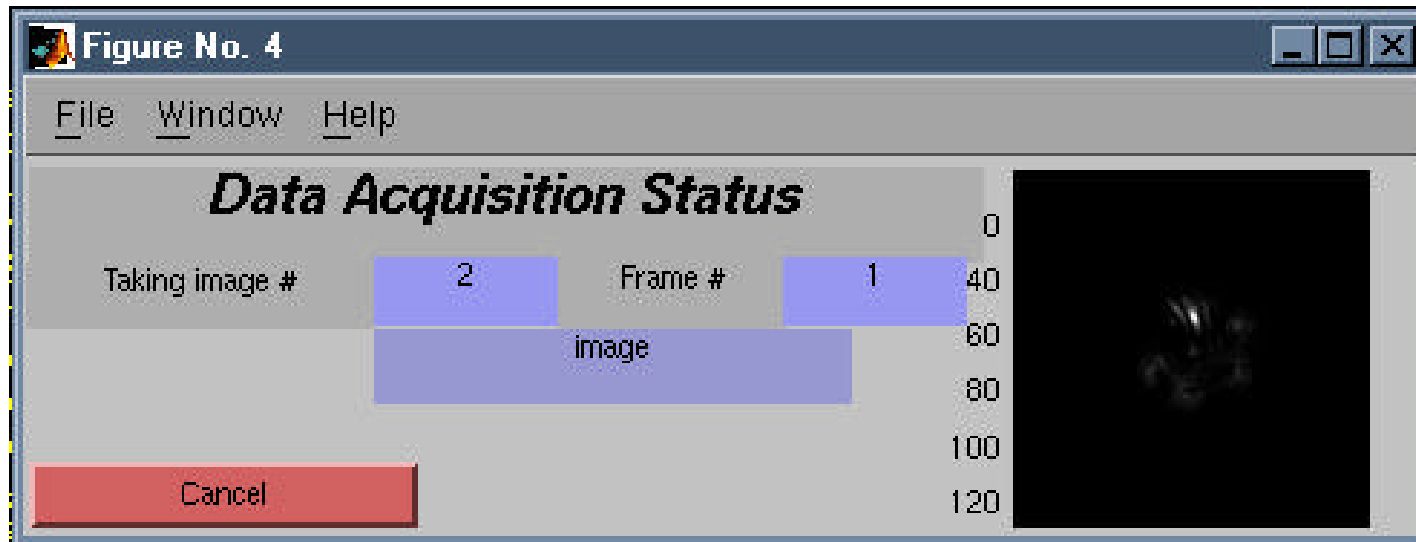
- Reports progress and displays data window as data is collected

WFS Control Panel

- Wavefront sensing parameters are specified
  - Does not drive hardware
- Progress is monitored as phase retrieval computations are performed
- Second window comes up during processing showing image match
- When done, ready to compute actuator commands (next panel)
  - "Go to WFC"

WFC Control Panel
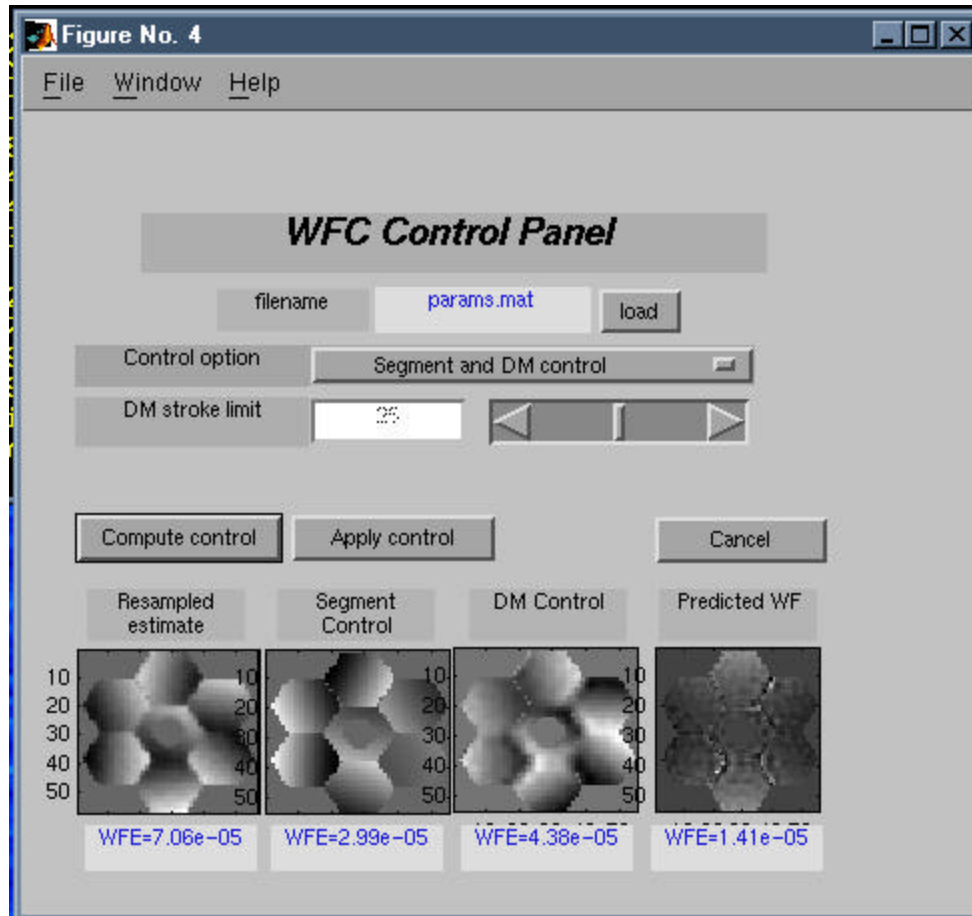
- Sets options for WF control (segments only, dm only, etc)
- Displays predicted corrected pupil
- Displays predicted DM and segment control actuations
- Commands optics to move
  – Repeat images, WFS to find out how well it really did

Development Schedule

- Build 1 - October 98
  - EXECUTIVE
  - SM
  - TSM
  - DFS
  - DM
  - Misc. Devices
- Build 2 - April 98
  - OTA
- Build 3 - TBD
  - FSM
  - MASPAR
  - general cleanup (address "feature-it is", robustness)
- Additional builds as necessary for subsequent phases of experiment